



DLA Strategic Materials
NDIA – E2S2

Strategic Material Supply Mitigation
Initiatives within DLA – Strategic Materials

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Report Documentation Page

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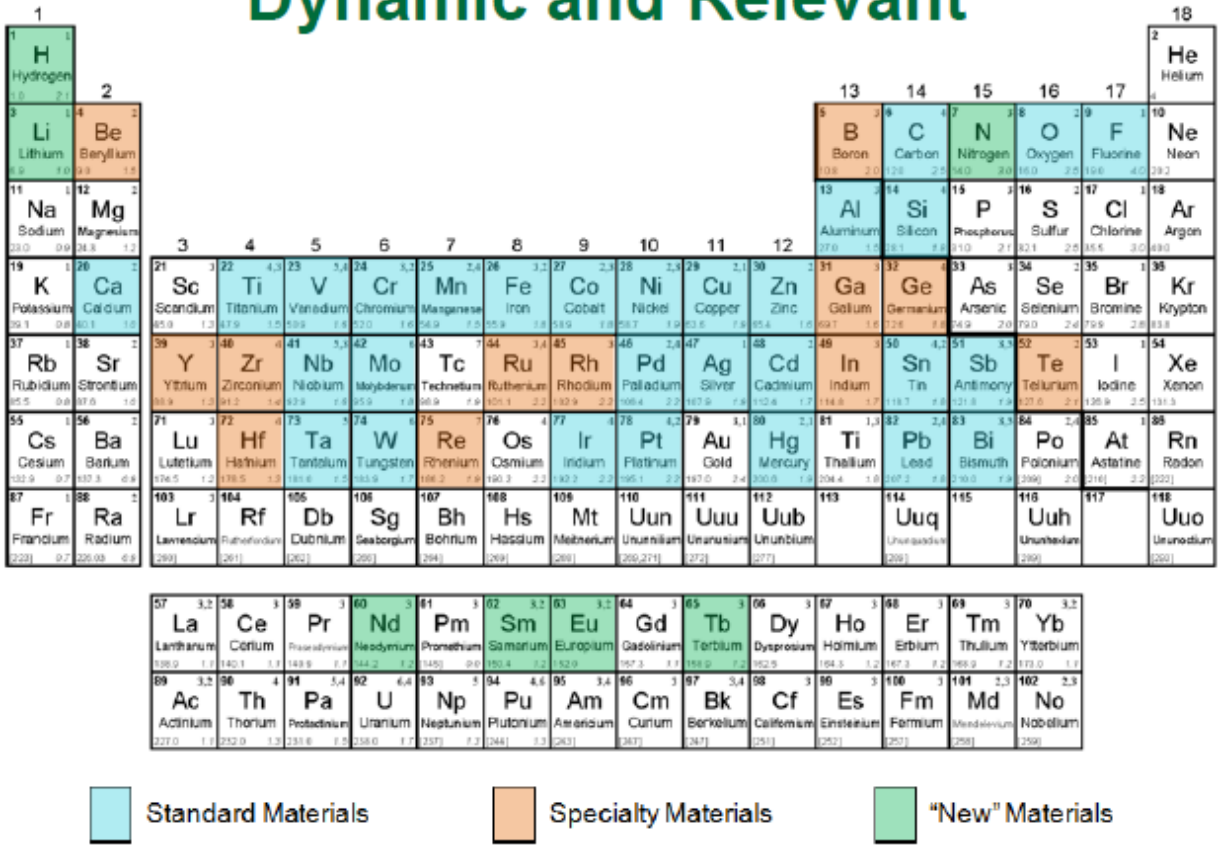
Definitions of critical and strategic

The SMPB Executive Secretary in it's meeting on December 12, 2008 detailed definitions for the following terms:

- **Strategic Material**
  1) A material which is essential for **important** defense systems.
  2) A material which is **unique** in the function it performs.
  3) A material for which there are **no viable alternatives**.
- Material Critical to National Security ("**Critical Material**")
  1) A material for which the Department of Defense **dominates** the market for the material.
  2) A material the Department's full and active involvement and support **are necessary** to sustain and shape the strategic direction of the market.
  3) A material (for which) there is significant and **unacceptable risk** of supply disruption due to vulnerable U.S. or qualified non-U.S. Suppliers.

The List of Strategic Materials Should Be Dynamic and Relevant



The Periodic Table is not all inclusive! It includes only elements!

Shortfall Shortage Mitigation Strategy

- Improved **re-use** and **recycling** of materials through targeted end of life actions and in-process **conservation** of materials.
- **Understanding** of the current levels of recycling and re-use of defense materials and components.
- **Identification of the barriers** to greater levels of recycling and re-use, particularly for materials identified as strategically important to defense or critical in terms of supply risk.
- **Development of programs and applicable policy** solutions to mitigate strategic and critical materials issues.

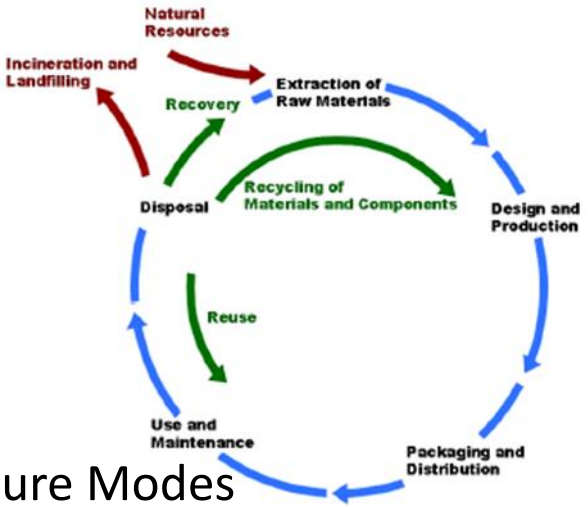
Shortfall Shortage Mitigation Strategy

RECYCLING (will require coordinated effort)

Efficiency (reduce front-end scrap)

- Near Net Shape Processing
- Intimate Processing

- **END of Life (long-term recovery)**
  - Life cycling modeling
  - Predictive Means to Evaluate Multiple Failure Modes
- **Material(s) Identification**
  - Multi-tiered Supply Chain
  - Bar-Coding, Labeling, Inscribing
  - Data Codes into FLSS/NSNs



Life Cycle Diagram

Materials Processing

End-Items

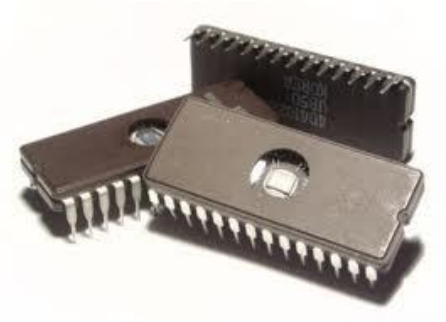
DLA Strategic Materials

- Programs listing (8)
  - DLA and Strategic Materials Management (Materials Identification)
  - Beryllium (DoD and DOD applications, Bulk Billet Upgrade) (Materials Conservation, Recycling)
  - Germanium (Billet Wafering and recovery) (Upgrade, Conservation)
  - Insensitive munitions (TATB, Fuze Molding Powders) Recycle
  - Super-Alloys (Rhenium, then Cobalt and Nickel) Possible Recycle Program
  - Magnetics (Master Alloy Buffers) Conservation
  - Rare Earths (Policy, Industrial, Dy, Er, Eu, Gd, Nd, Pr, Y)
  - Titanium (armaments and recovery policy) Conservation

Strategic Materials Management

Clothing & Individual Equipment

Platforms, Guidance and Control



Microcircuits

Batteries

Strategic Material Management System

DLA SM and DLA R&D

- **Development of Statement of Work to Design Program (Draft Under Review)**
- **Intra-Agency Program which will involve many DLA Staff Offices (J3, DLA DS, DLA R&D, etc.), plus Interface with DoD (Services)**

Portfolio: SCM	**Sponsor**: Mr. Luis Villarreal	**Customer**: Buyer/Industry	**Implementer**: J-74/MTS/Deloitte
Strategic Plan/Director's Guidance Link: Warfighter Support Enhancements and Business Process Refinements			
Project sends, receives, or stores data (IT): Yes	**J-6 POC (if applicable)**: Patrick Mulcahy (IA)	**R&D Mgr**: N. Seiling 804-279-5120	
Program Manager's Assessment:	S2MS included in IBMS/WICAP IT Dashboard – Baseline to deploy NLT 3/31/2010		

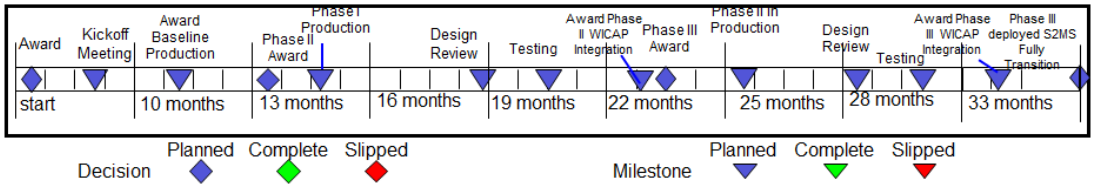
Problem: Raw materials represent a critical path constraint to defense manufacturers. Availability directly impacts an industry's capability to surge production during war or to meet other surges in demand (e.g., grounded weapon system for safety requiring 100% replacement). **Additionally, the Defense National Stockpile Center (DNSC) as manager of the Strategic Material Security Program (replaced National Defense Stockpile) requires identification of strategic materials required to support DoD Weapon Systems, supply chain risks and actions to mitigate the risks.**

Objective: Develop tool set (functionality for the Worldwide-web Industrial Capability Assessment Program (WICAP) to collect and analyze material production requirements and market intelligence (capability, capacity, product lines, closings, expansions, feeder stocks), assess supply chain risks and identify alternate materials/technologies

Project Costs: ($ in Millions *Insert total cost here*)

	FY Year 1	FY Year 2	FY Year 3	FY Year 4	FY Year 5
R&D	0.800[1]	0.500	0.250		
Other	1.250[2,3]	0.080	0.080		

Key Performance Parameters	Threshold	Objective	Actual
Companies Registered	50	200	0
Part-to-Material Mapping	50,000	140,000	0



DLA R&D Conclusions for DLA Strategic Materials

R&D Challenge:

- Automated capture of commercial and engineering data into the Federal Logistics Information System (FLIS)

R&D Objectives:

- Improve the quality, speed, and cost of logistics data acquisition and management
- Effectively map the Strategic Materials within Defense Weapons Systems
- Develop the process and tools for managing acquisition, reutilization and disposition decisions related to Strategic Materials content

Plans:

- Provide tools to military activities via DoD Engineering Drawing & Modeling Group
- Initiate projects in technical data mining

Methodology:

- Leverage capabilities of DLA Logistics Operations R&D (J335)
- Parametric search tools for product characteristics (DLIR)
- Logistics and technical data sharing with OEMs (DLIR, WSS)
- Mapping technical characteristics (Casting & Forging)
- Develop decision-based and risk assessment tools (WSS, SCM)
- Conduct business process analysis and roadmaps (WSS)

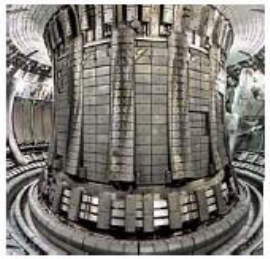
Beryllium

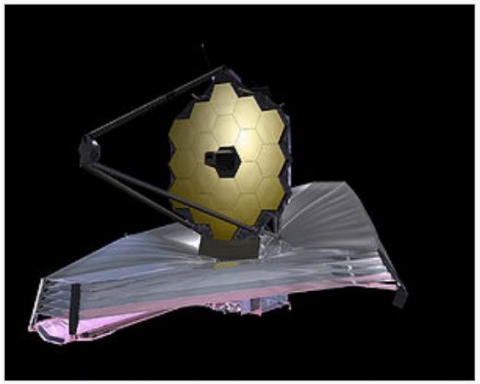
- Pure Be and high Be composites
  - Light weight, stiff (guidance, optics, missiles, etc.)
  - Good thermal properties (electronic packaging)
  - Transparent to x-rays (medical, etc.)
  - Neutron reflector (weapons, reactors, etc.)
- Two thirds of Beryllium Products' revenue (90% of the Be by weight) is defense and space
- Major commercial applications
  - x-ray windows (medical, industrial)
  - detectors (scientific)
  - acoustics (speakers)
  - optical scanners
  - semiconductor processing equipment

Beryllium IMU

Beryllium Sunshade and Optics

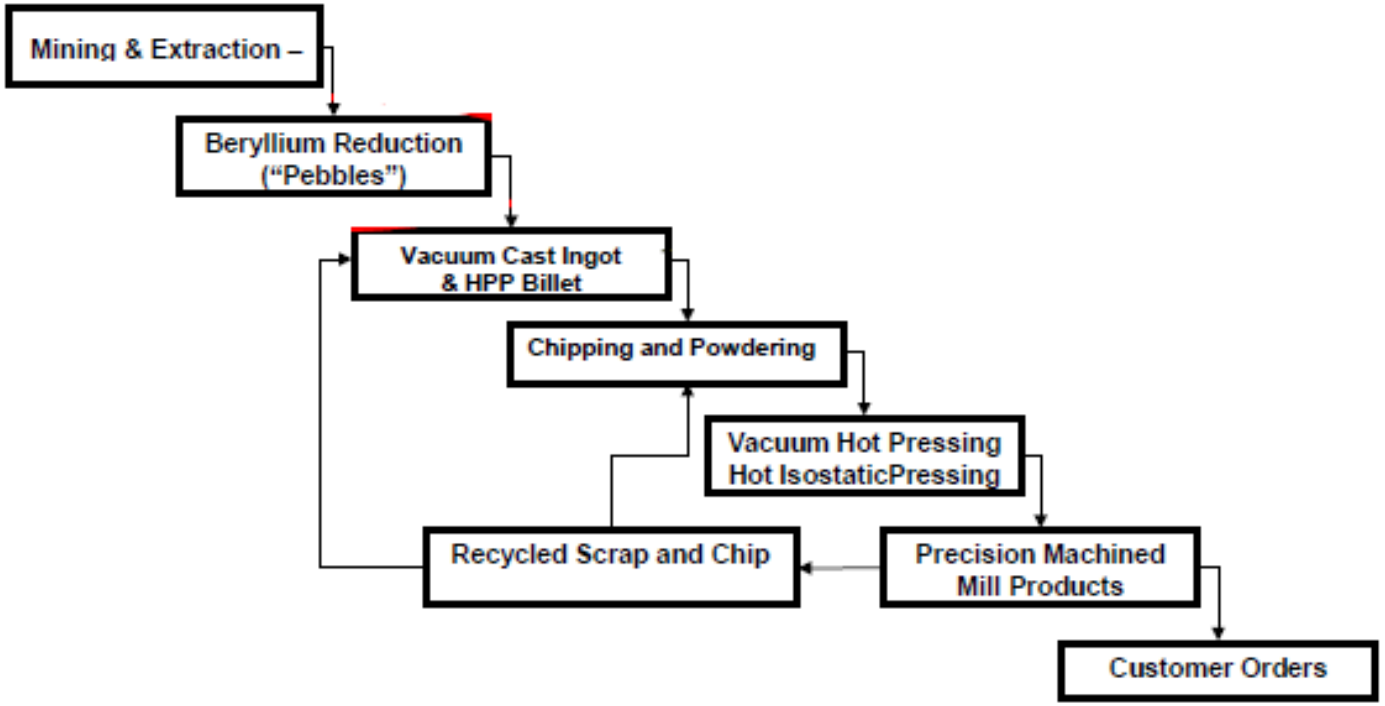
- Fission test reactors
  - Reflectors
  - Detectors
- Fusion reactors
  - JET
  - ITER
- DoE Weapons
- Nuclear fuels
  - Braze materials
  - Additives (developmental)





3/4 view of JWST from the "top" (opposite side from the Sun).

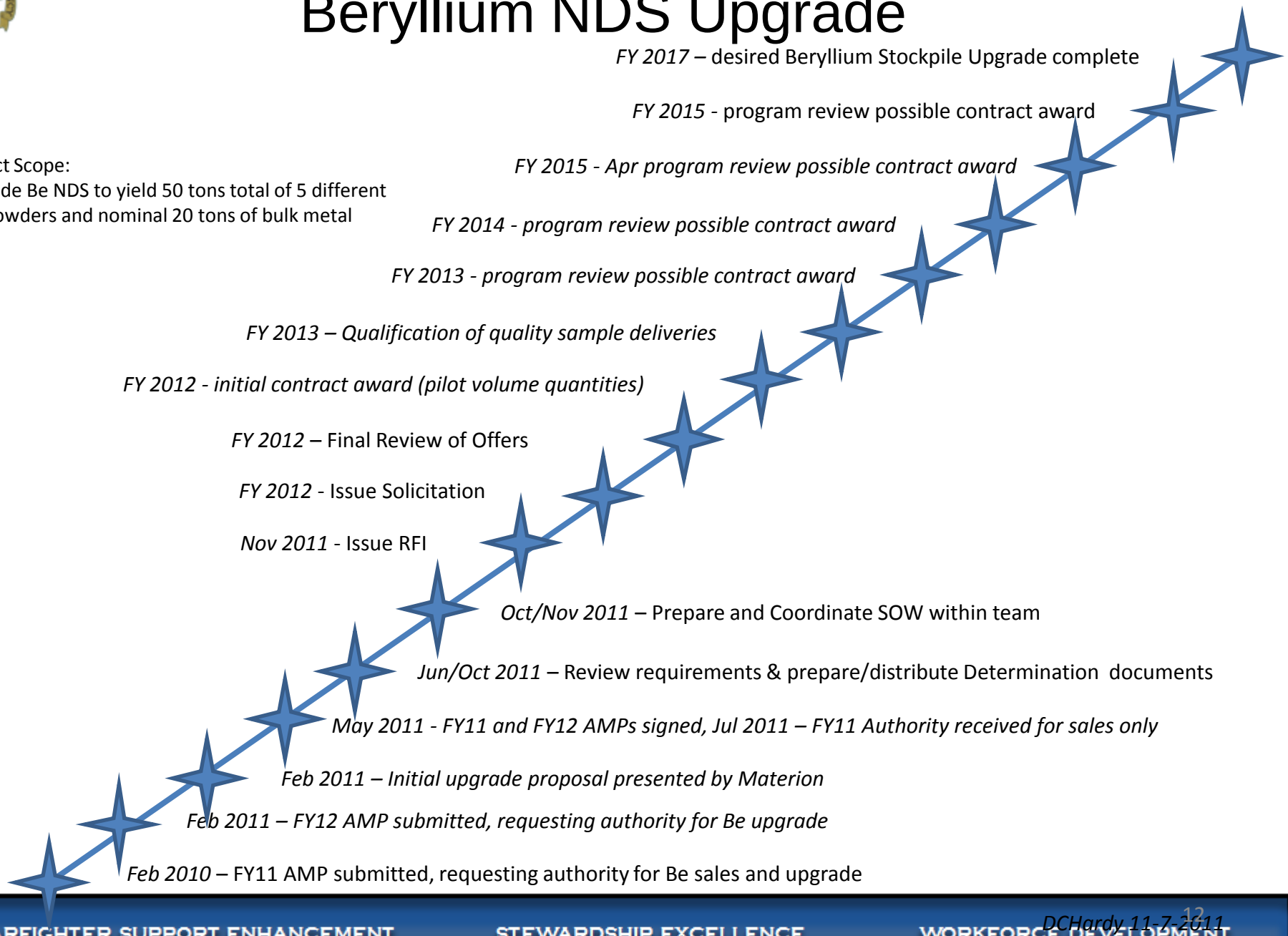
Manufacturing Process for Be Metal Products



NOTE: Recovery of scrap presents a technology issue. As oxide will readily form, especially on fines, thus severely limiting ability to place back into process. Ideally, material is sourced to support near-net forming, thus minimizing waste and scrap up-front rather than design for recovery at product end-of-life.

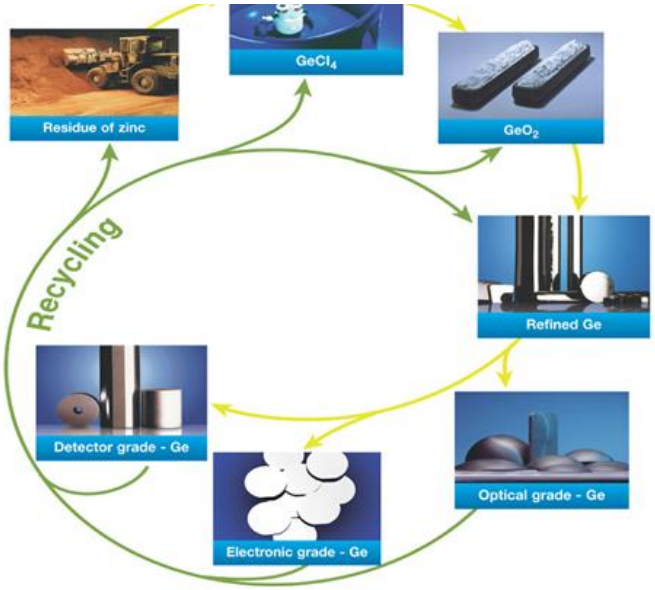
Beryllium NDS Upgrade

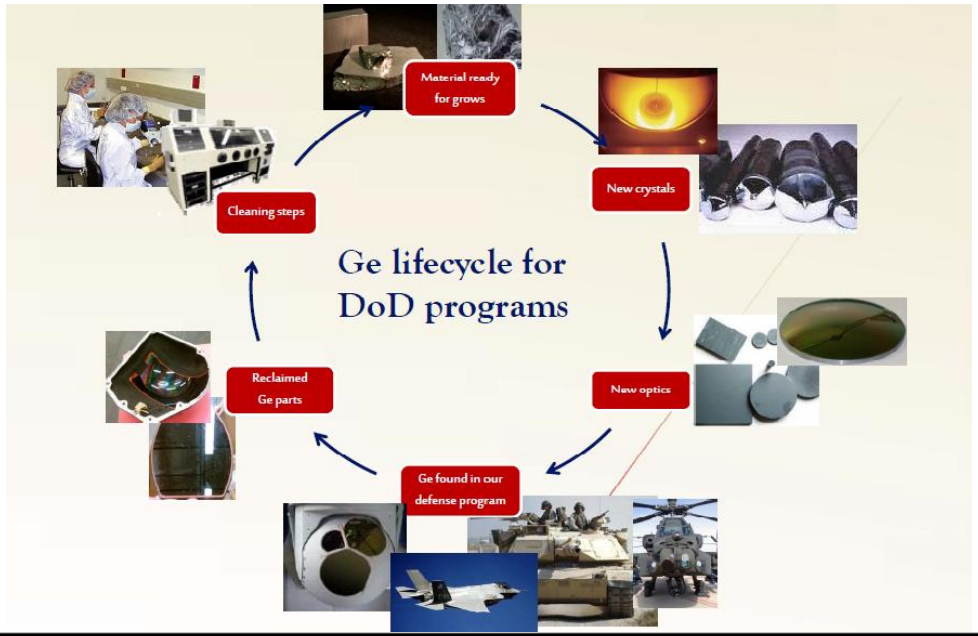
Project Scope:
Upgrade Be NDS to yield 50 tons total of 5 different HIP powders and nominal 20 tons of bulk metal



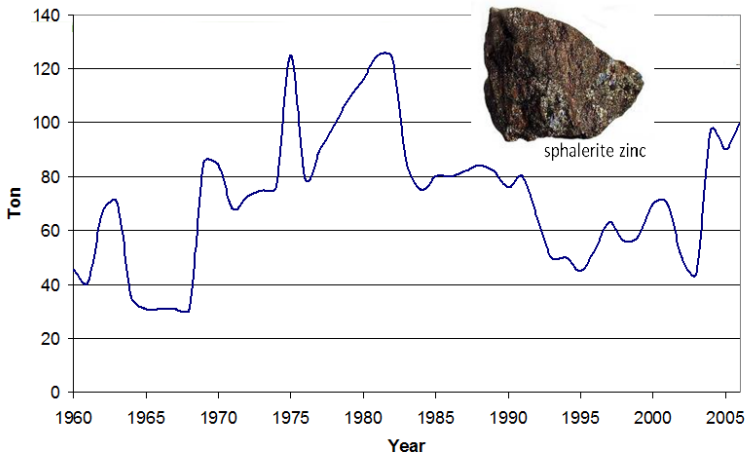
Germanium

- In 2007 35% of the demand was met by recycled germanium
- DoD requires Ge for wide range of products and applications such as "windows" and photovoltaic (PV) application (both terrestrial and space)
- Processing material further "up" supply chain, i.e. oriented doped wafers, conserves material while positioning stockpile to respond to DoD requirements, due to needs (crisis or natural disaster)





Ge world production



Sources of data are the U.S. Bureau of Mines and the U.S.Geological Survey—Minerals Yearbook (MYB); Mineral Commodity Summaries (MCS) and Commodity Data Summaries (CDS)

On-Going - Product End-of-Life Recycling (DCMO)

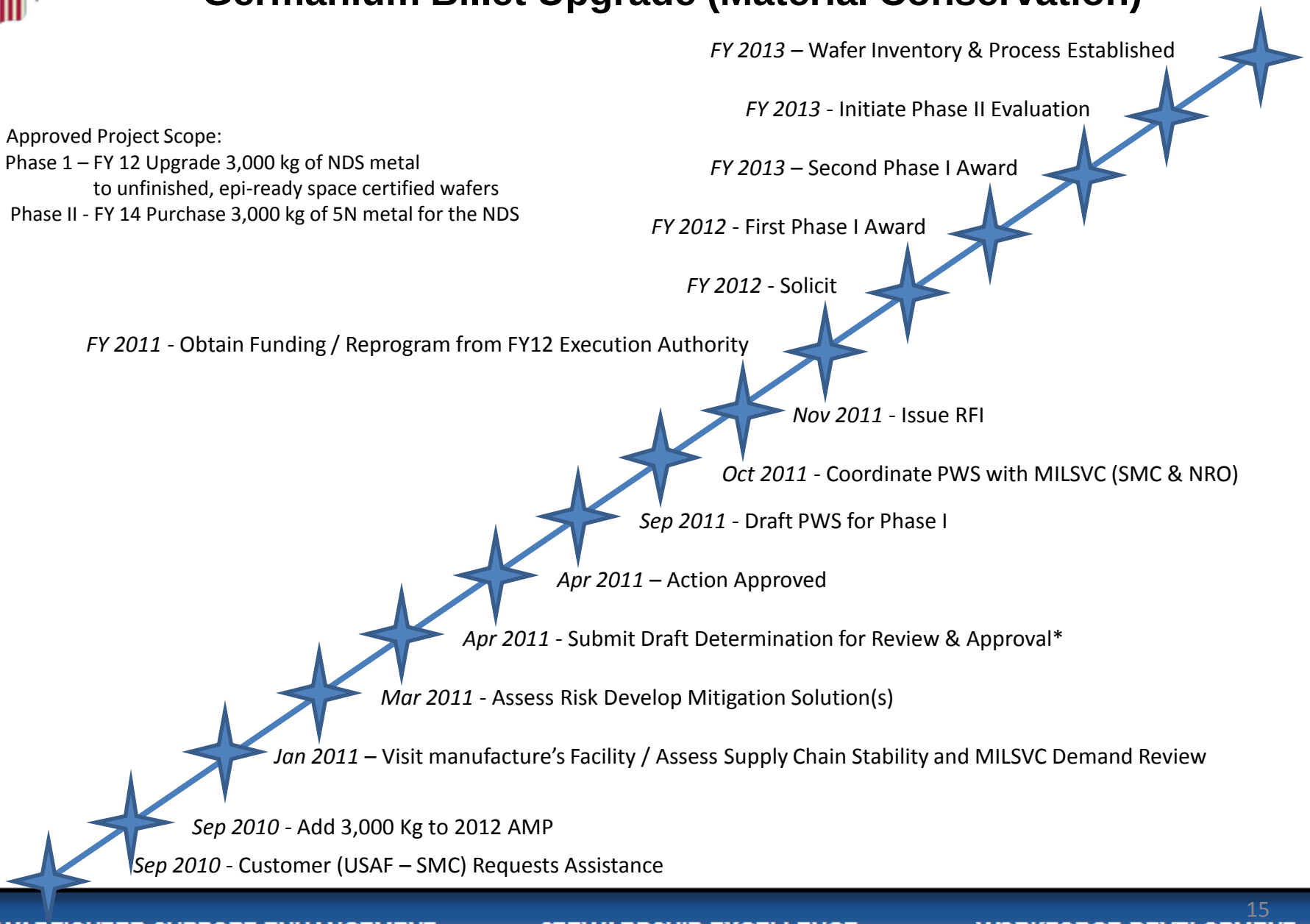
Department of Defense Germanium Reclaim/Recycling Program

Decommissioned infrared (IR) transmission windows which are used for target imaging are recycled. These windows, of various sizes and curvatures are found in FLIR components, such as laser guidance, missile targeting and night-vision/thermal imaging/sensing devices used in many system platforms, such as M1 tanks, Apachi helicopters, AF fighter jets, ships, etc.

Any hazardous coats, such as Thorium must first be removed from recovered scrap/reclaimed materials. However accomplished, the scrap is refined for regrowth of new crystal boules/ingots for use in new IR components for platform applications.

Germanium Billet Upgrade (Material Conservation)

* Approved Project Scope:
  Phase 1 – FY 12 Upgrade 3,000 kg of NDS metal
  to unfinished, epi-ready space certified wafers
  Phase II - FY 14 Purchase 3,000 kg of 5N metal for the NDS

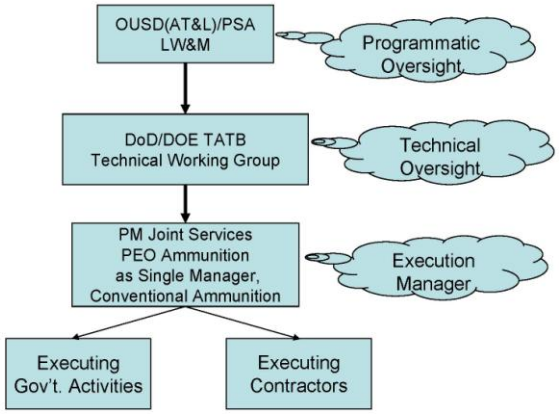


1,3,5-Triamino 2,4,6-Trinitrobenzene (TATB) Facilitization, A Joint DOD / DOE Collaborative Program

(Establish Process and Reclaim/Recycle Munitions)

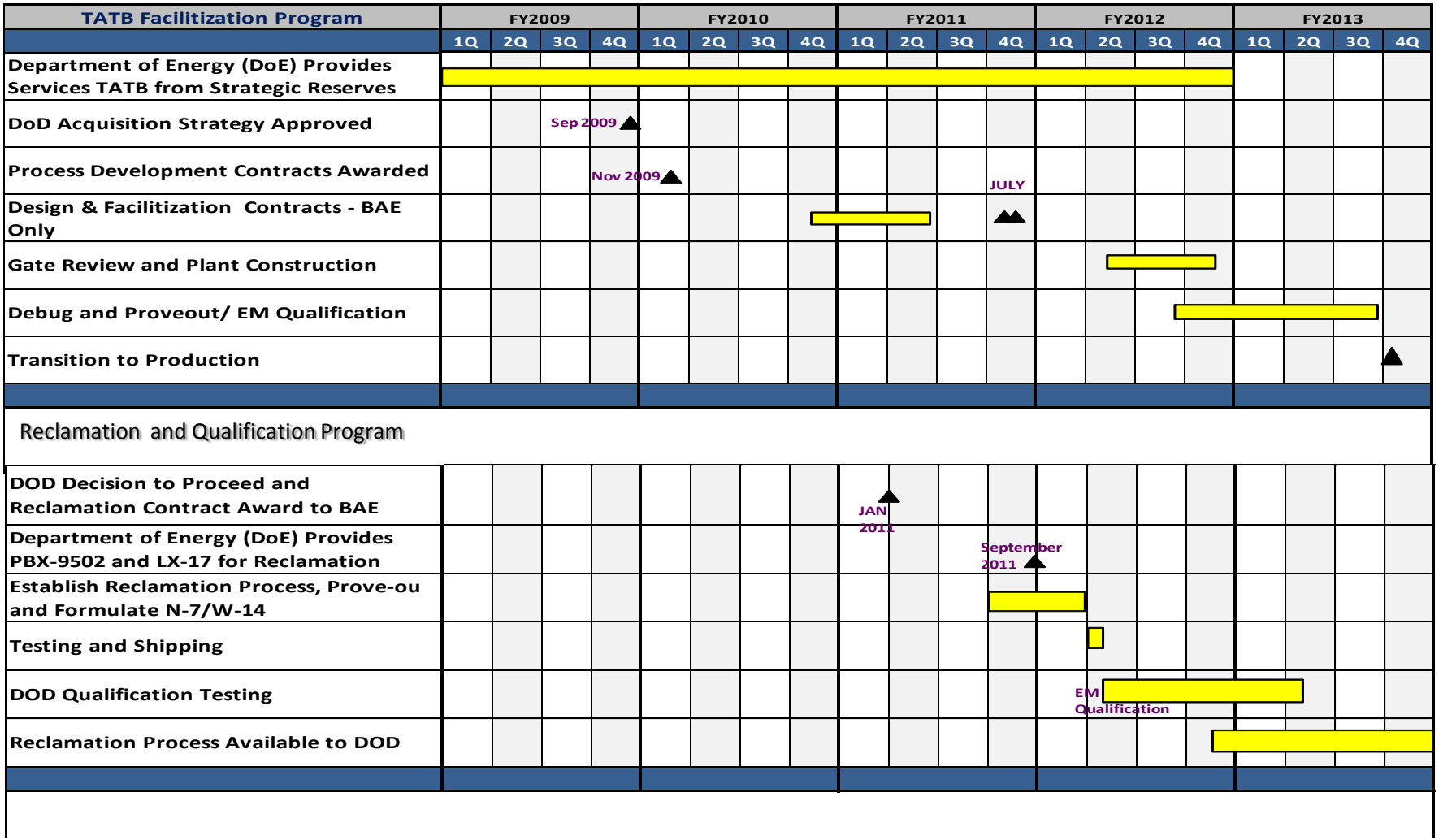
- Memorandum of Agreement was executed on TATB in 2009, between the Department of Defense (DOD) and the Department of Energy (DoE). The MOA established a collaborative Program effort to develop and qualify a domestic production source for 1,3,5-Triamino 2,4,6-Trinitrobenzene (TATB) explosive.
- The Agreement facilitated by the Office of the Secretary of Defense, Land Warfare and Munitions (LW&M), was established between the Departments of Army, Navy and Air Force, and the National Nuclear Security Administration, DoE to produce TATB via the Benziger Synthesis Process.
- DLA SM to support efforts for Insensitive High Explosive (IHE) Triaminotrinitrobenzene (TATB) Based Molding Powders used for PBXN-7, PBXW-14, PBX-9502 and LX-17-series

TATB Project Governance



Insensitive High Explosive Munitions (IHE)

1,3,5 trichlorobenzene (TCB), triaminotrinitrobenzene (TATB) and Molding Powders for PBXN-7/PBXW-14/PBX-9502/LX-17 series Fuzes



DLA Strategic Materials is Active Member :

- **Interagency – Interservice Working Group** on Insensitive High Explosive Materials
- **Interservice Working Group** on Energetic Materials

Active DLA Strategic Materials Programs On-Going:

- **Funding** in-place for NNSA and DoE services TATB certification/qualification
- **Determinations complete** with intent to bring TATB and Molding Powders into the stockpile.

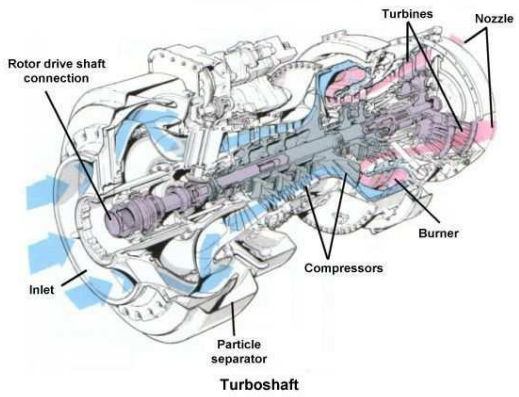
Program Accomplishments:

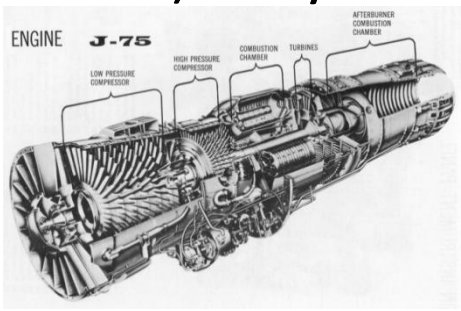
- Title III Installation completed and reclamation process developed by BAE Industries at HAAP.
- TATB pilot run using “reclaim” performed end-of-month April 2012.
- Process and results reported by DOD/DOE Working Group at JANNAF Conference, 30 April – 4 May 2012.
- Commercial effort reported on by BAE at NDIA IMEM, 14 – 17 May 2012.

DLA Strategic Materials Program Objective:

- Establish temporary **Vendor-Held Buffers for TCB and TATB**, (Eliminating requirement to re-introduce domestic TCB manufacture).
- **Acquire TATB and Molding Powders** for Sequestered Stockpile
- **Fund** Certification and Qualification Requirements for DoD and DOE uses.

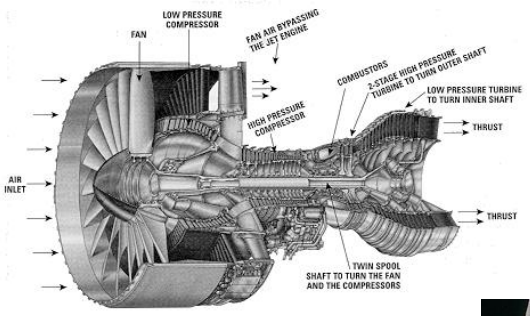
Super-Alloys (Rhenium, then Cobalt and Nickel) Recycle Potential



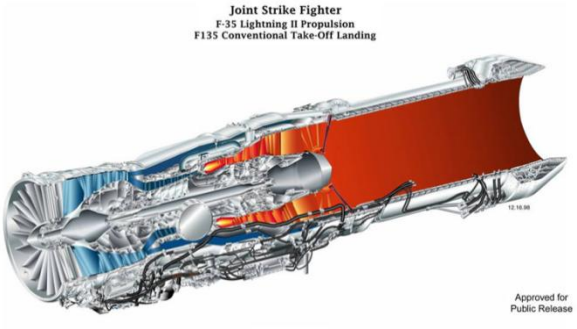


The twin-spool type Pratt & Whitney J-75 turbojet engine with afterburner as used in the F-105B Thunderchief

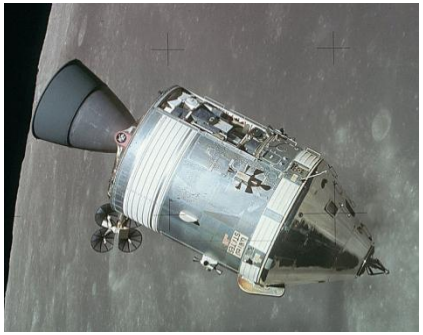
Refractory metal alloys include Rhenium, Nickel, Cobalt, Niobium, Molybdenum and Tantalum based alloys are used in Jet engines and rocket motors.



This is a Pratt & Whitney PW4084 turbofan



Pilot end-of-life 3-year metals 2008-2011, recovery program at Tinker Air Force Base, from engines focused on Nickel alloys netted funds to cover cost-of-program, vendor profit and allow General US Treasury deposits.



Apollo CSM with the dark rocket nozzle made from niobium-titanium alloy

S&CM Recovery & Reuse Programs

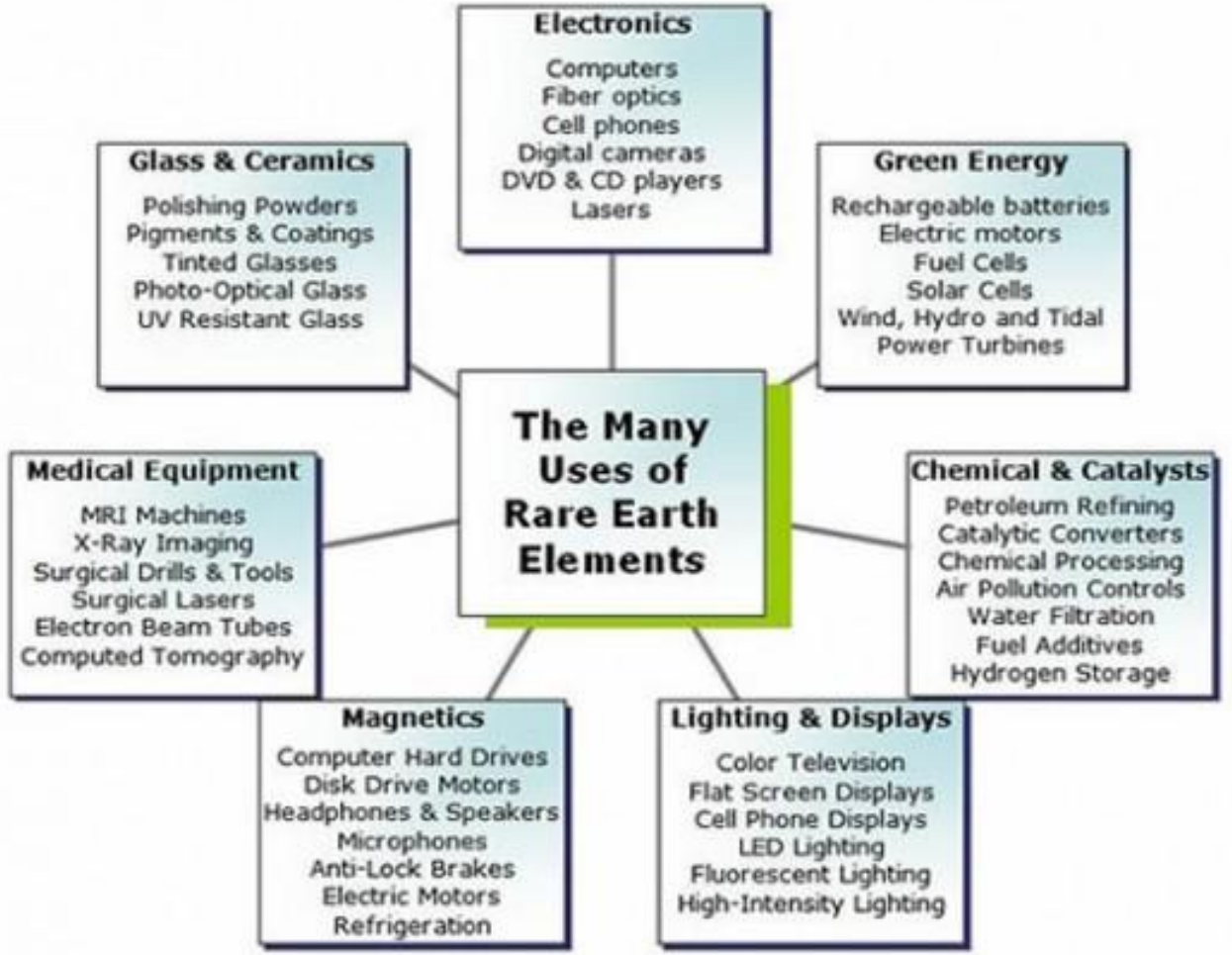
- 2003-2008 – Rhenium costs and OEM lead times increase by 10X – Sourcing availability and DoD programs impacted

- 2008 – Services Sponsored Programs to Recover Refractory
  - April 2008, MetalOC-ALC Tinker AFB / GDIT start SMRRP Period of Performance
  - Jul 2008 – DA Sec Def directs NAVAIR to work w/ USAF, DLA (DNSC), DRMS, DSCR, and Gen. Arthur Morrell (No results noted - Navy explores independent "credit only" proof of concept with GEA.
  - Jun 2009 – Navy/GEA pilot "credit only" deal signed
  - May 2009 – SMRRP first "Notice of Availability " to GE & Pratt for super-alloy auction
  - Jun 2010 – NAVAIR formal multi-year contract with GE
  - Jul 2010 – DLA-SM-MO outreach with AMARG regarding S&CM aviation scrap recovery results in contacts with Tinker AFB SMRRP representatives
  - Oct 2010 – DLASM delegation to ALC/processing facilities for process evaluation & meetings
  - Apr 2011 - USAF Economic Analysis reports SMRRP Proof of concept self funding & self sustaining with significant ROI
  - May 2011 - Air Force Audit Agency reports no adverse findings in SMRRP

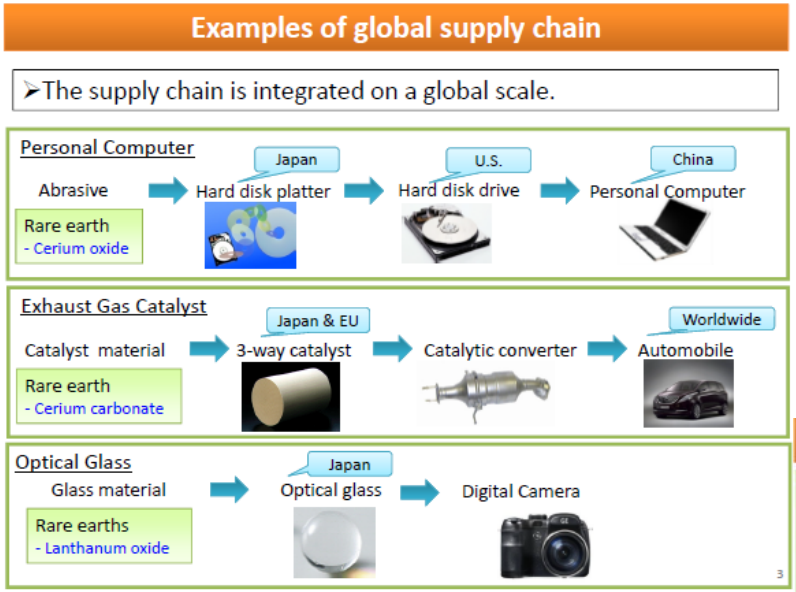
- FY 2012 – DLA SM "DRAFT" Material Disposition Determination Documents for rhenium completed
  - Program under review regarding legal and work to be performed
  - Services and DLA SM coordination still on-going

Rare Earth Materials Program (Policy)

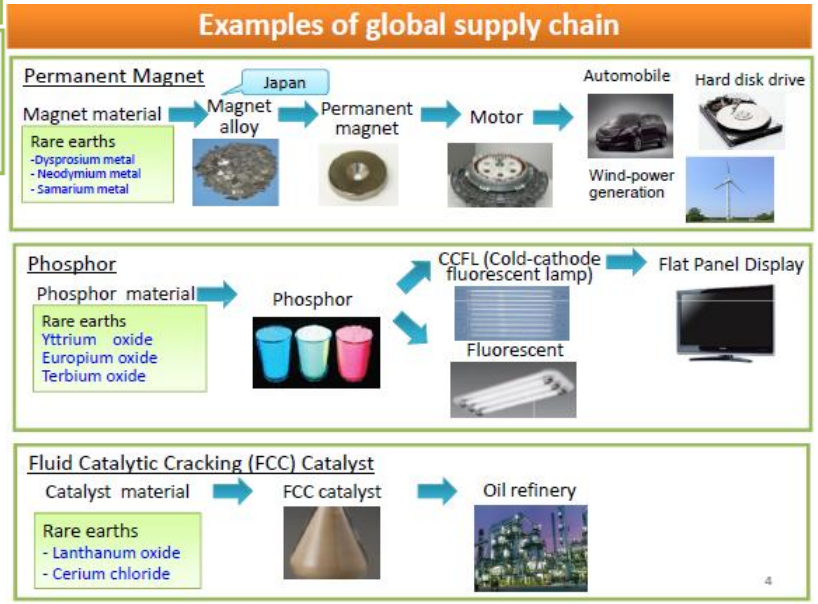
17 REEs, known as lights (cerium group – La, Ce Pr, Nd, Pm, Sm, Eu) and heavies (yttrium group – Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu), with "1000's" of applications.



Rare Earth Materials Programs (Recommend Policy)



- Base Ores, Processing and Final Products Involve World-Wide Trade Activities

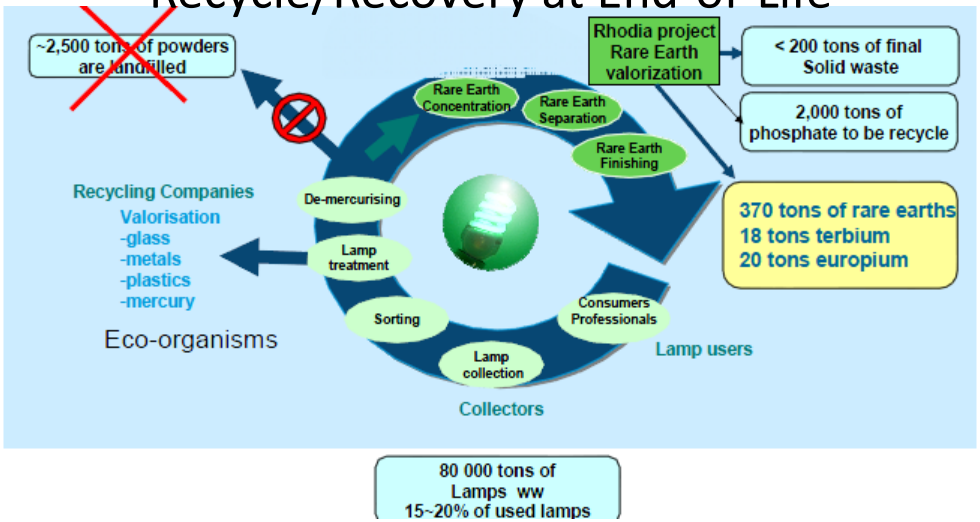


DLA Strategic Materials, Actions to Effect Policy

- **2011 NDAA, section 843**, report to congress on criticality of REE to DoD and Essential Civilian, finalized Jan 2012
- **2011 DLA SM RR Update** to congress, established REE strategic need for DoD and Essential Civilian.
- **2012 NDAA, section 853**, report to congress on establishment of NDS REE inventory, in work and expected to congress Sep 2012.
- **2012 NDAA, Section 1080**, HRC 112-329, report to Congress on REE Recycle Desirability and Feasibility is "in-work".
- **2013 DLA SM RR** report to congress, material list focuses on REE strategic and DoD critical needs, in work with suspense of Jan., 2013.
- **Participant and member** in series of private industry/academic, inter-agency and international working groups;
  - Yale University (Materials Criticality Working Group)
  - "843/853" Working Groups (inter-service)
  - DOE (AMO, HUB, tri-lateral US, EU, JP)
  - TTCP (international GB, CA, AU, NZ), METI/JOGMEC (international US, JP)

Examples of Existing Governmental Policy and Incentive Programs

EU Program for Phosphors Recycle/Recovery at End-of-Life



Japan Program for Abrasives Recycling

A example of policy package in Japan

Cerium oxide for abrasives

6/2011 Inport-157ton

1.Promoting repeated use by improvement of abrasive process

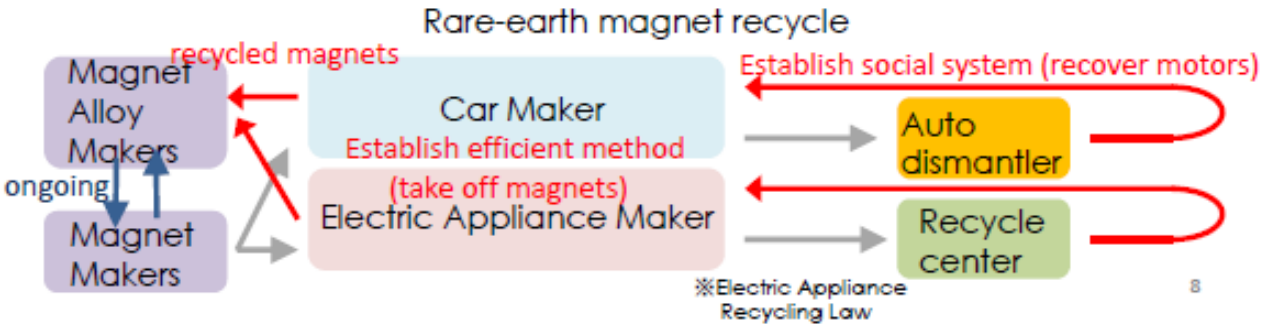
2.Promoting recycling by improvement of abrasive machine

3.Promoting the development of substitute materials

(Substitute materials ZrO_2, Mn_2O_3)

Japan's domestic demand for cerium is expected to decrease by half.

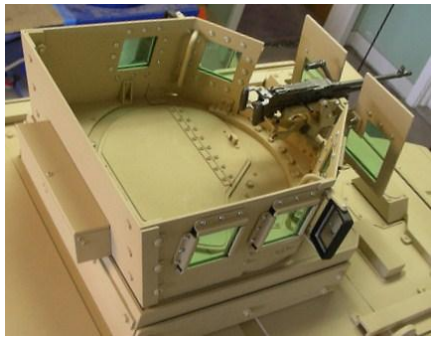
Proposed EU Program Promoting Magnet Recycling



Titanium Plate Purchase Program (Front-End Material Conservation, Recycle)

- Joint program between DoD and ARDEC to take advantage of established contracts at DLA Strategic Materials
- Using IDIQ contract, using set price and set customer and order
- Processing of purchased plates using water-jet cutting technology to minimize scrape and mill tailings.

- Net-shape parts are directly cut from rolled plates.
- Resulting “OFFAL” is easily recycled and not a contaminated waste
- Vendor committed to buy-back all cut-stock
- Program resulted in over $1.5MM in material related savings



Future possible programs

- Fluorspars (reclaim of industrial by-products)
- Ir upgrade - reclaim
- Sn upgrade (recovery of oxidized materials)
- III-V Metals (CZT wafering and Te program excess)
- Alternative Energetics
- Recovery of all DOE and other service/agency DOD program related excess materials (Be, BeO, Te, etc.)

QUESTIONS?

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DEFENSE LOGISTICS AGENCY

AMERICA'S COMBAT SUPPORT LOGISTICS AGENCY